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CLAIMS

1. (amended) Plasma processing apparatus that produces gas plasma in a vacuum chamber by generating an electromagnetic field so as to treat an object by the plasma, comprising a balanced transmission line that is connected to a high-frequency power supply and that has a terminal thereof used to attain an impedance match, wherein:

two conductors constituting said balanced transmission line are disposed vertically.

2. Plasma processing apparatus according to Claim 1, wherein said balanced transmission line is disposed within said vacuum chamber.

3. Plasma processing apparatus according to Claim 2, wherein a gas inlet is formed above said balanced transmission line.

4. Plasma processing apparatus according to Claim 2, wherein said balanced transmission line is formed as a heater.

5. Plasma processing apparatus according to Claim 4, wherein a high-frequency current fed from said high-frequency power supply and a heater direct current are superposed on each other on said balanced transmission line.

6. Plasma processing apparatus according to Claim 1, wherein said balanced transmission line is disposed outside said vacuum chamber.

7. Plasma processing apparatus according to Claim 1, wherein one of said conductors constituting said balanced transmission line is disposed outside said vacuum chamber, and the other conductor is disposed within said vacuum chamber.

8. Plasma processing apparatus according to Claim 7, wherein said balanced transmission line comprises two conductors embedded in the top and bottom of a dielectric, and a gas passageway and a gas outlet are

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formed in said dielectric plate.

5 9. Plasma processing apparatus according to Claim 7, wherein said balanced transmission line comprises two dielectric plates each having a conductor, the space between said two dielectric plates is used as a gas passageway, and a gas outlet is formed in the lower dielectric plate.

10 10. Plasma processing apparatus according to Claim 1, wherein said balanced transmission line is curved.

10 11. Plasma processing apparatus according to Claim 10, wherein said balanced transmission line is formed spirally.

15 12. Plasma processing apparatus according to Claim 10, wherein said balanced transmission line is formed tortuously.

13. Plasma processing apparatus according to Claim 10, wherein the spacing between adjoining portions of said balanced transmission line is not equal.

20 14. Plasma processing apparatus according to Claim 1, wherein said balanced transmission line is connected to said high-frequency power supply over a coaxial cable via a balun.

15 15. Plasma processing apparatus according to Claim 1, wherein said object is a semiconductor wafer.

25 16. (amended) Plasma processing apparatus that produces the gas plasma in a vacuum chamber by generating an electromagnetic field so as to treat an object by the plasma, comprising a microstrip line that is connected to a high-frequency power supply and that has a terminal thereof used to attain an impedance match, wherein:

30 said microstrip line comprises at least a grounded plane and a conducting strip disposed within said vacuum chamber; and

35 a gas introduction path is formed between said ground plane and said conducting strip.

17. Plasma processing apparatus according to Claim 16, wherein a dielectric is interposed between said

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grounded plane and said conducting strip, and a gas passageway and a gas outlet are formed in said dielectric plate.

5 18. Plasma processing apparatus according to Claim 16, wherein said conducting strip is formed spirally.

19. Plasma processing apparatus according to Claim 16, wherein said conducting strip is formed tortuously.

10 20. Plasma processing apparatus according to Claim 16, wherein the spacing between adjoining portions of said conducting strip is not equal.

21. Plasma processing apparatus according to Claim 16, wherein said object is a semiconductor wafer.